

(12) UK Patent Application (19) GB (11) 2 298 761 (13) A

(43) Date of A Publication 11.09.1996

(21) Application No 9504484.8

(22) Date of Filing 07.03.1995

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(51) INT CL⁶

H04M 3/50

(52) UK CL (Edition O)

H4K KF50A

(56) Documents Cited

EP 0539104 A2

(58) Field of Search

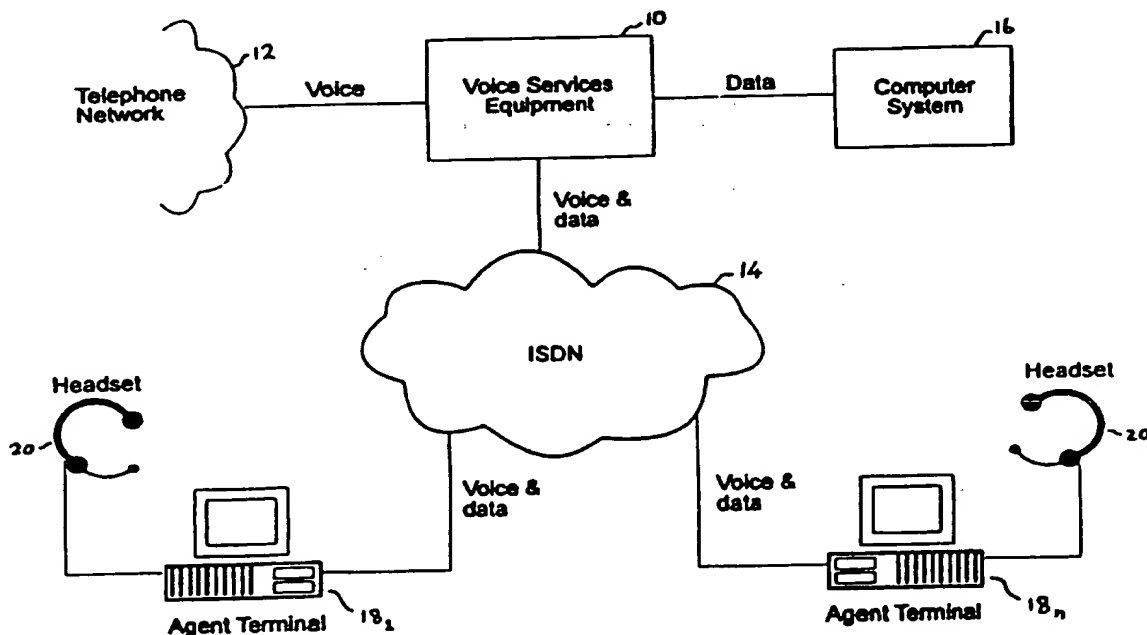
UK CL (Edition N) H4K KF50A KF50X

INT CL⁶ H04M

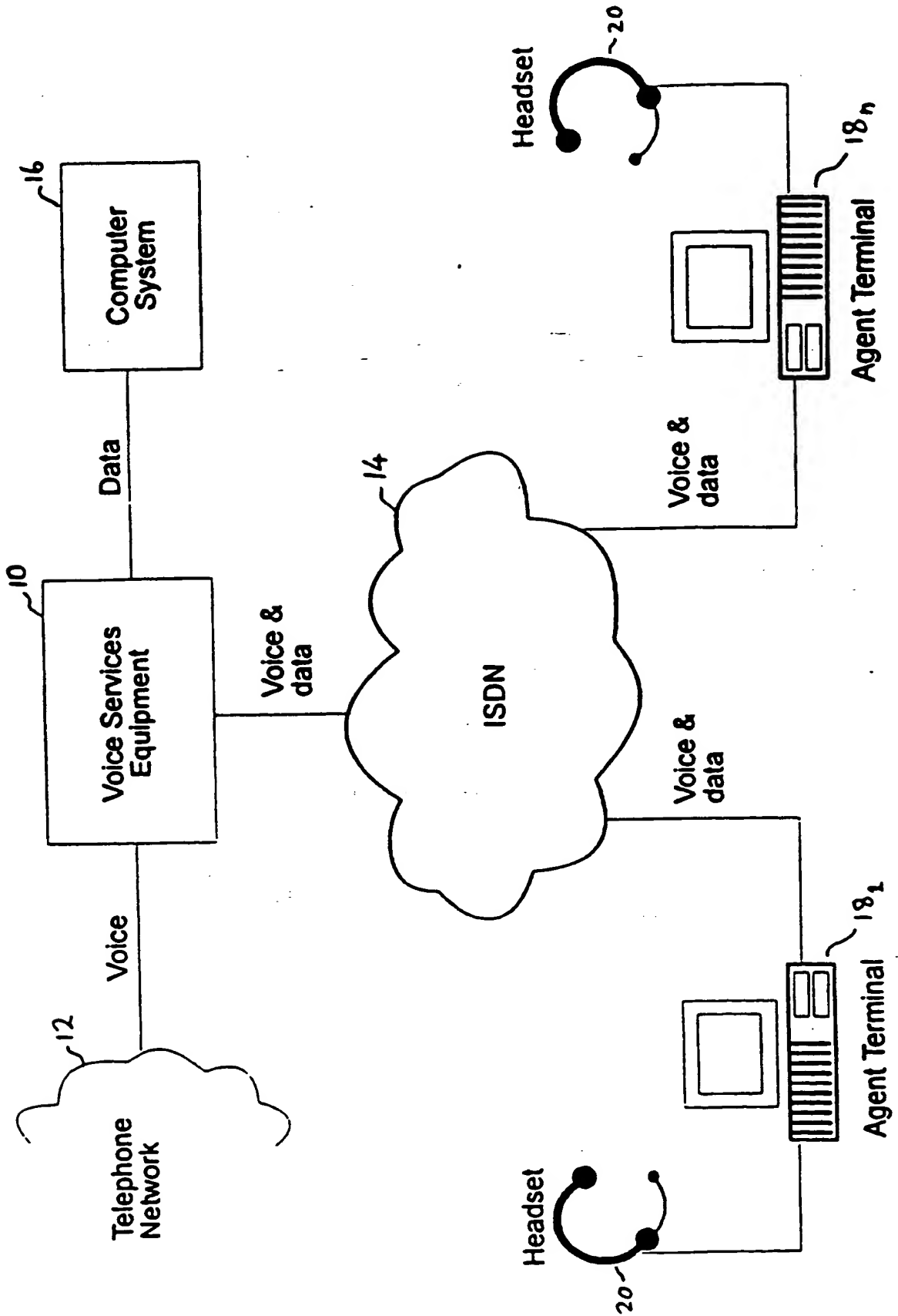
Online: WPI

(54) Voice services system including a network database

(57) A voice services system includes a centralised network database provided by a computer system 16 associated with a voice services equipment (VSE) 10, and provides network automatic call distribution (ACD) functionality with dialling out to local or remote agent terminals 18₁-18_n via ISDN connections 14 which allow both voice and data to be sent digitally. Thus, for the purposes of handling a caller on the telephone network 12, the agent terminal does not require a separate connection to the computer system 16 if further information is required, since the ISDN connection 14 can handle both voice and data.



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VOICE SERVICES SYSTEM INCLUDING
A NETWORK DATABASE

This invention relates to a voice services system including a
5 network database, which system can be used in telephony services which
involve the handling of telephone callers by one of a number of
operators during which each operator will use a computer system to
access information about the caller, and/or about a product or service,
and/or to enter information supplied by the caller, such as name and
10 address, to request or register for a product or service.

It is known for a voice services equipment (VSE), which may also
be referred to, amongst other terms, as a voice response system (VRS)
or an interactive voice response (IVR) equipment, to be connected to
the telephone network and typically provide pre-recorded announcements
15 to telephone callers. Callers may interact with the system using their
voice or the telephone dial or keypad to alter the service flow or to
enter information (e.g. account number, PIN) to answer questions or to
obtain specific information.

The service provided by the VSE may be controlled directly by an
20 applications program residing on the VSE, or on an external computer.
The VSE will typically have several methods of interconnecting to
external computers.

A VSE will normally support multiple applications on the same
equipment, with the service provided to each caller dependent upon the
25 number dialled.

A VSE may provide facilities for call completion by an operator
(agent). This may be achieved by transferring the call back into the
telephone network (in a similar way to call transfer on a PABX), or it
may be achieved by dialling out on a separate line to make a connection
30 between caller and agent via the VSE. The latter method has the
advantage that the agent may more easily pass the call back to the VSE
so that the caller can be provided with further recorded information or
may further interact with the automatic system. In addition, the VSE
can monitor the call progress to enable provision of billing or
35 accounting information for example.

An Automatic Call Distributor (ACD) is also known, being
essentially a telephony switching device, similar to a PABX, which

provides the ability to distribute incoming calls to particular agents or groups of agents. Call distribution may be dependent upon a number of factors including number dialled, origin of call, time of day, and agent availability. An ACD will typically include a queuing function, so that if an appropriate agent is not available immediately the caller will be held until one becomes free.

An ACD may incorporate some form of voice services functionality allowing the caller to be informed that he is in a queue, his position or likely waiting period. The voice services system may also provide other announcements and may allow the caller to enter information using the telephone or by speaking.

When an ACD connects a caller to an agent, it is typical for the agent to be provided with some information about the type of call. In a basic system this could be merely a display of the dialled number, which would enable the agent to greet the caller appropriately and to provide the required service.

In more advanced installations, the ACD provides a data link to a computer system; the agent has a terminal connected to the computer system. Software running on the computer will accept information from the ACD regarding the type of call etc., and will present appropriate information on the agent's screen. The software can take several forms, e.g. it may be a specific applications program dedicated to a particular function or type of call, or it could be a database management system which would enable the agent to enter caller details directly into the database or obtain specific information, for example.

The voice and data links from the ACD to each agent/agent terminal are typically achieved by separate connections.

The agents connected to the ACD may be in different locations, for example the agents may work from home. The situation in which a person may work from home using the telephone network for voice and/or data communications typically with a computer system at an organisation's central site, may be known as teleworking.

The ACD would normally be located on the organisation's premises, but it could be located on the premises of the telephone company (or network operator). The ACD functionality may be embedded in the network operator's switching equipment, e.g. Centrex services (Centrex is essentially PABX or ACD functionality provided by the network

operator in the Central Exchange).

A network ACD is also known, this referring to the use of a VSE with onward routing capability to provide both recorded voice services, with or without caller interaction, in conjunction with ACD
5 functionality.

An example of such a service could be for ticket ordering. A caller may ring a general service which might provide details of concerts, plays etc. The caller would interactively identify a particular event and be given specific details of ticket availability,
10 prices, etc. If the caller then wished to order a ticket he could be transferred to the booking-office for the appropriate venue. If all agents at the required booking office were busy, the caller would be invited to hold and would be placed in a queue.

The system would typically dial out into the telephone network to
15 deliver the call to the required destination, but the connection might also be by private circuit (leased line).

A network ACD system will typically contain information regarding the status and availability of agents - this could be held within the VSE or on a host computer connected to the VSE and situated at the VSE
20 site or at a remote site. The VSE or host computer may also be linked, directly or indirectly, to the computer system(s) at the distributed agent site(s). Such a connection enables the agent to be presented with information about the caller or call type as the call is connected, and also enables an agent to indicate his status (e.g.
25 availability to take calls).

Normal telephone network connections are typically used either for voice or data transmission. In some applications, e.g. where there are bandwidth restrictions, voice and data may be transmitted over the same telephone circuit; a number of techniques are available to achieve
30 this.

The Integrated Services Digital Network (ISDN) provides an end-to-end digital connection and while this path can be readily used for high quality voice or high speed data transmission, it also provides a medium for simultaneous transmission of voice and data. An ISDN Basic
35 Rate connection point provides two 64kbit/s ports (B channels) and a 16kbit/s data path (D channel). ISDN terminals may utilise any or all of these connections independently or simultaneously, although use of

the D channel may be dependent upon the facilities provided by the network operator.

5 A problem with known telemarketing systems is that the agents will generally require both a telephone connection to the VSE and also a separate connection between their terminals and one or more central computers with respective databases of required information. This can be complex and relatively costly with an on-site system in which all agents work from the same premises and the computer(s) are on the premises; it is even more of a problem with teleworking or other
10 systems in which the agents are remote from the premises and/or the computer is located elsewhere. In that case, complex connection systems involving separate telephone lines to the computer(s) are necessary, which diminishes the attractions and advantages of working from home.

15 The present invention provides a voice services system including a network database for providing data, the system comprising:

means for connecting a caller on a telephone network to one of a plurality of agent terminals so that voice communication can take place between the caller and an agent at a selected agent terminal; and

20 means enabling the agent to access the network database for data transfer between the network database and the agent terminal, which data may be required to respond to the caller;

wherein the caller connecting means is a voice services equipment associated with the network database, the voice services equipment
25 being connected to the agent terminals by means of a voice/data network capable of providing both voice and data communication via a single connection, and wherein the data transfer between the network database and the agent terminals is via the single connection on the voice/data network.

30 A preferred embodiment of the invention provides a centralised database system based upon a VSE, in conjunction with an internal or external computer system, providing network ACD functionality with dialling out to local or remote agent positions via ISDN connections. The ISDN connection enables both voice and data to be sent digitally
35 using one or more B channels and/or a D channel. The application software or database system, which is used by the agent to provide a service to the caller, resides on the centralised database computer.

Thus, for the purposes of handling the caller and providing the required service, the agent or agent terminal does not require any connection to the organisation's computer system (although such a connection may be provided for further on-line or off-line access for information retrieval or reporting, for example).

The caller is therefore connected through a public or private telephone network to the centralised database system; there will typically be some interaction between the caller and the VSE, which will at some stage dial out via ISDN to an agent terminal. The ISDN connection will provide both voice and data paths. The voice path is used for direct communication between the caller and the agent; the data path is used for communication between the central computer system and the agent terminal - allowing appropriate applications-dependent and caller-dependent screens to be displayed on the agent terminal, and allowing data entered by an agent to be sent back to the central computer.

In order that the invention may be more readily understood, a preferred embodiment will now be described by way of example with reference to the accompanying single figure drawing which shows a block diagram of a network database system according to the preferred embodiment.

Referring to the drawing, a voice services equipment (VSE) such as a Telsis Hi-Call is connected to the PSTN, for example on a 2Mbit/s digital trunk interface. It is also connected to an ISDN, for example on a Primary Rate interface; as an alternative example, connection may be via one or more ISDN Basic Rate interfaces. The VSE is further connected to a central computer system, for example via a local area network (LAN).

Any number of agent terminals may be connected to the ISDN, typically via Basic Rate interfaces. The connection between an agent terminal and the ISDN may be direct or indirect (namely via a PABX or an ACD). An agent terminal may be a PC-AT compatible with ISDN interface and audio facilities, providing connection to a headset with headphones and microphone.

The VSE may incorporate standard voice services facilities including the ability to play announcements to the caller, record messages from the caller, and optionally detect and decode input from

the telephone handset (e.g. DTMF tones, pulses from decadic phones, data from smart phones), the caller (e.g. speech recognition, voice detection), provide data output (e.g. fax, data for smart phone display) and provide additional interactive functionality (e.g. conference bridging).

The VSE 10 may also incorporate digital signal processing (DSP) facilities, which provide resources for speech and data coding and for detecting and decoding caller input. There is then preferably DSP resource for each line (i.e. caller), although this need not necessarily be the case.

The DSP facilities in the VSE 10 receive from the telephone network an incoming data stream of 64kbit/s PCM which is converted to 32kbit/s ADPCM for internal storage (e.g. caller message recording); similarly, announcements are stored using 32kbit/s ADPCM and converted to 64kbit/s PCM for replay to the caller.

When a caller is connected via the VSE 10 to an agent terminal (e.g. 18₁), whereas for a single voice call there would be a straight through 64kbit/s path from caller to agent, for the centralised database system the connection from the VSE 10 to agent is 32kbit/s ADPCM for voice and 32kbit/s for data. The DSP thus performs the code conversion and packages both voice and data into the 64kbit/s stream.

The data component is received from the central computer system 16 via the LAN.

Similarly, the 64kbit/s stream received from the agent terminal 18₁ comprises 32kbit/s for voice (which is converted by the DSP to 64kbit/s PCM for output to the caller), and 32kbit/s for data (e.g. keyboard input), which is transmitted via the DSP to the applications program on the computer system 16.

A typical service flow could be as follows.

A caller requiring help with a new microwave oven rings a help line number over the telephone network 12.

The call is answered by the VSE 10, which uses DDI to automatically select the appropriate service from a number of different applications residing on the system.

The flow of service is dictated by the applications program on the VSE 10 or on the central computer system 16.

The caller enters the serial number of the microwave oven, using DTMF tones.

The applications program decides that operator assistance is required.

5 The central computer system 16 decides which agent is to be used (dependent upon time of day, location of caller, agent availability, agent expertise, etc.).

The VSE 10 asks the caller to hold.

10 The VSE 10 dials out via the ISDN 14 to a selected agent terminal (e.g. 18₁).

The VSE 10 sends initial data to select the application on the agent terminal 18₁ and fills in the caller details (e.g. serial number of microwave oven).

15 The VSE 10 connects a full duplex audio path between the caller and the agent at the terminal 18₁.

The agent uses terminal facilities (e.g. keyboard/mouse) to access database information, which is transmitted via data packets from the central computer system 16 to the agent terminal 18₁.

The agent solves the customer problem.

20 The calls are cleared down.

It will accordingly be apparent that the proposed system offers significant advantages compared to those presently known. In particular, it is sufficient for there to be a single connection (of sufficiently high bandwidth/data rate, such as that provided by ISDN) between each agent terminal 18₁-18_n and the VSE 10, over which both
25 voice communication between caller and agent, and data communication between the agent terminal and the VSE 10 and/or the central computer system 16, can take place. Thus home facilities for teleworking, or other off-site arrangements, need not be unduly complex. Also, there
30 is greater flexibility in the siting of the computer system 16, since a single data link to the VSE 10 is sufficient rather than some form of networked connection direct to the agent terminals 18₁-18_n.

The system offers a number of possible further options or features, these being described in the following.

35 The applications program which provides the agent terminal functionality may reside on the centralised database (i.e. the terminal

effectively acts in a "dumb" mode, with all intelligence at the central computer system 16) or on the agent terminal (i.e. the terminal effectively acts as a workstation, with only the data being exchanged between terminal and central computer). In the former case, operations
 5 updates can be easily achieved centrally, without the need to update individual terminals.

The central computer system 16 may be contained within the VSE 10 or may be external to the VSE 10 as shown in the drawing.

The central computer system 16 may support one or more VSEs.

10 There may be one or more trunk connections for incoming calls. Also, or alternatively, there may be one or more trunk connections for outgoing calls. Instead, there may be only one trunk connection, which is used for both incoming and outgoing calls.

The VSE 10 may be provided with a call queuing function so that,
 15 if a required agent is not available, the call can be queued until the agent has terminated the earlier call and is once more available.

Incoming trunk connections may be to the PSTN, ISDN or private network.

The incoming trunk connections could be analogue, since there is
 20 no requirement for data transfer in the incoming calls.

The connection between the VSE 10 and the external central computer system 16 could be via any interconnect, e.g. asynchronous interface, X.25 or the like.

The agent terminal need not be PC-AT compatible. The requirement
 25 is that it has an ISDN interface, audio input/output facilities and processing capability to separate the voice and data components of the ISDN data stream.

The voice/data encoding is not limited to 32kbit/s each. The implementation may be application dependent - alternatives include:

30 48kbit/s voice, 16kbit/s data
 64kbit/s voice, interleaved with 64kbit/s data bursts as and when required
 64kbit/s voice and 64kbit/s data, using 2B channels
 64kbit/s voice with use of ISDN D channel for data
 35 etc.

Where the ISDN implementation provides appropriate support, integral ISDN data fields, such as "User to User Information" (UUI) can

be utilised to provide application set up and caller specific information at the outset of the call.

5 The caller may have recorded information (e.g. name) on the VSE 10 and, depending upon the application, it may be necessary to replay that information to the agent before the voice path is established between caller and agent.

10 In some applications, completion of the agent activity may not terminate the call; for instance, the caller could be returned to the VSE 10 to receive recorded information. For example, the caller may have identified himself to the agent (e.g. number and PIN), who would then enable dial out to a third party, or access to a particular service (e.g. a value added service or closed user group service).

15 As described above and shown in the drawing, the VSE 10 includes both the voice services part of the equipment and the switching part for providing the voice and data paths between the various component parts of the system. It will however be apparent that the voice services part and the switching part need not be included in a single piece of equipment, but may instead consist of physically distinct interconnected modules.

20 It will be clear from the foregoing that the system is not limited to telemarketing activities but is applicable to use in any telephony services involving handling of telephone callers by one of a number of operators using a computer system to access and/or enter information. As a further example, the system could be applied to
25 account call services where the caller speaks to an operator giving details such as card account number, PIN code and destination telephone number. Following validation by the operator using the centralised database, the call will be completed by dialling out to the destination.

30 The system has been described in the context of the ISDN format, but it will be apparent that it would be equally applicable to any other network format capable of handling both voice and data.

CLAIMS

1. A voice services system including a network database for providing data, the system comprising:

5 means for connecting a caller on a telephone network to one of a plurality of agent terminals so that voice communication can take place between the caller and an agent at a selected agent terminal; and

means enabling the agent to access the network database for data transfer between the network database and the agent terminal, which
10 data may be required to respond to the caller;

wherein the caller connecting means is a voice services equipment associated with the network database, the voice services equipment being connected to the agent terminals by means of a voice/data network capable of providing both voice and data communication via a single
15 connection, and wherein the data transfer between the network database and the agent terminals is via the single connection on the voice/data network.

2. A voice services system according to claim 1, wherein the
20 voice/data network is ISDN format.

3. A voice services system according to claim 1 or claim 2, wherein the network database is a computer system forming part of the voice services equipment.

25 4. A voice services system according to claim 1 or claim 2, wherein the network database is a computer system connected to the voice services equipment via a data transfer interconnect.

30 5. A voice services system according to any one of the preceding claims, wherein functionality of the agent terminals is provided by the network database.

6. A voice services system according to any one of claims 1 to 4,
35 wherein functionality of the agent terminals is stored at the terminals.

7. A voice services system according to any one of the preceding claims, wherein the voice services equipment provides a call queuing function.

5 8. A voice services system substantially as hereinbefore described with reference to the accompanying drawing.

Patents Act 1977**Examiner's report to the Comptroller under Section 17
The Search report)**Application number
GB 9504484.8**Relevant Technical Fields**

(i) UK Cl (Ed.N) H4K: KF50A; KF50X

(ii) Int Cl (Ed.6) H04M

Search Examiner
AL STRAYTONDate of completion of Search
15 MAY 1995**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: WPI

Documents considered relevant
following a search in respect of
Claims :-
ALL**Categories of documents**

- X:** Document indicating lack of novelty or of inventive step. **P:** Document published on or after the declared priority date but before the filing date of the present application.
- Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category. **E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A:** Document indicating technological background and/or state of the art. **&:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0539104 A2 (ATT) column 5, line 27 - column 6, line 12	1-7

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).